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Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Progress in
The Application of
Industrial Lubricants

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Progress in The Application of Industrial Lubricants

THE *right lubricant* in the *right amount* in the *right place* at the *right time* — these four factors spell satisfactory lubrication.

Lubrication requirements of modern machines with their high speeds, heavy loads and close tolerances have increased severely over the years. The development of lubricants has kept pace with the requirements, and new and improved products to satisfy the needs continue to be made available in increasing numbers. Careful consideration invariably accompanies the selection and purchase of lubricants to assure that the proper products are obtained for the applications involved. However, the best lubricant in the world is of no value until it is applied to the bearings or other surfaces to be lubricated. In fact, the proper application of the lubricant is equally as vital to the satisfactory performance of a machine as the selection of the right product. This has been a weak link in the series of steps that lead to satisfactory lubrication. The fault has been not the lack of adequate facilities and means for applying lubricants, but rather the failure to adopt and employ these methods for machine lubrication.

The familiar hand oiler and the squirt can were among the first devices used to apply lubricants to machinery. Although inefficient and dependent entirely on the human element, they provided a cheap and an adequate means of administering lubricant to satisfy the limited requirements of the earlier machines. The number of points to be lubricated on these old machines were few and because of the slow speeds, light loads, and large clearances, it mattered little whether the bearings were over-lubricated, under-lubricated, or lubricated at all in some cases.

However, the design of modern machines practically precludes the use of such primitive, inefficient methods of applying lubricants. Not only are the bearings in today's equipment far more numerous, but they are precision-built to operate at much more severe conditions. Satisfactory operation depends not only on the right lubricant, but also on the right amount applied at the proper time. Thus, controlled application is essential. Furthermore, the size of the average industrial plant has increased many-fold over the years. All factors considered, it is just too much to expect an oiler, equipped with a grease gun or squirt can, to locate every point that requires lubrication and see that it is lubricated properly. Modern machines require devices for lubricant application which are as independent as possible of the human element. On the surface at least, it would appear that this is pure common

Courtesy of Gits Bros. Mfg. Co.

Figure 1 — Gravity Feed Oiler

sense. However, there is still a large segment of industry relying on out-moded methods of applying lubricants to maintain and protect its expensive production equipment. Many times a mechanical failure may be blamed on the lubricant, when actually the application is at fault.

Surveys of plant lubrication practices have revealed some astounding findings — not only with regard to the wide extent of malpractices and the resultant costs thereof, but also as to the amount of overall savings that have been realized by the correction of these practices. Inefficient methods, lack of standardization of techniques for applying lubricants within a plant or even on one piece of machinery, and dependence on the human element are three common factors which are at the root of most bad lubrication practices. The following brief account of an actual case history[1] will serve as a striking illustration of these points.

A study was made of the lubrication practices as related to 60 machine tools which perform multiple machining operations including turning, boring, drilling and reaming. These machines had been in operation for ten years, and the operators were assigned the responsibility of lubricating the tool slides. They were furnished with hand grease guns and were supposed to devote fifteen minutes of every eight hour shift to lubricate the twenty-one points on each machine. The result of the study revealed that the tool slides either were being lubricated improperly or had not been lubricated for a long period of time. The reasons for this condition were found to be numerous and varied, including the following: Neglect on the part of the operator; new operator not properly instructed as to his responsibility; grease gun lost or misplaced; no grease on hand; fittings damaged or missing.

These conditions were corrected by installing a central system on each machine and relieving the operators of the responsibility for lubrication. The results that followed were amazing. Maintenance cost was reduced sixty percent. Production from these machines was increased twenty percent. The quality of the work was better. The amount of rejects was decreased substantially because with proper lubrication, size and finish were maintained more consistently. These factors all added up to tremendous savings and greatly improved operations.

This experience has been repeated over and over again in plants where measures have been taken to correct faulty, inefficient methods of applying lubricants and is typical of the benefits that can be realized.

There are many varieties and types of equipment available for application of industrial lubricants, ranging from devices to lubricate a single bearing to automatic, central systems capable of lubricating all of the machinery in a plant. Each of these fills a need and occupies a definite niche in the general field of applying lubricants. Some of the typical methods and techniques will be discussed in the following sections. The equipment and devices illustrated are to be regarded only as representative examples. Obviously it is impossible to cover the whole field in this one short article. Furthermore, no attempt will be made to compare the relative advantages or disadvantages of one method with another.

BOTTLE OILERS AND THEIR VARIATIONS

Bottle oilers and modifications thereof have been in use for a long time. However, great improvements have been made over the years in their efficiency, flexibility and appearance. Lubricators of this type are quite simple in principle. Basically they consist of a small reservoir equipped with some device for controlling the lubricant feed. By installing a single-feed unit at each point to be lubricated, every bearing in effect is provided with its own individual lubricating system. Some of the variations are now available in the multiple-feed versions, where one reservoir supplies lubricant to twenty or more points.

Normally, these oilers are relatively simple to install and easy to maintain. The reservoirs may be either glass or plastic, thus permitting the oil supply to be visible at all times. Plastic reservoirs are shatterproof, a feature which makes them particu-

[1] Industry and Power, March, 1952

larly desirable for use on machinery in industries such as food processing. However, the plastic is affected adversely by high temperatures, and reservoirs of this material should not be used in locations where the temperature may exceed 150-170°F.

These oilers must be serviced occasionally, and of course the reservoirs must be refilled when the oil supply is depleted. Due to the wide range of reservoir capacities available, selection of oilers can be made so that refilling should be necessary not more than once a week, and normally they should operate a month or longer with one charge of oil.

Gravity Feed Oilers

Oilers of this type are very simple in design. They are mounted above the parts to be lubricated, and the oil flows downward due to the force of gravity. Normally the rate of flow is controlled by a needle valve, and can be adjusted over a wide range. Changes in temperature of the oil in the reservoir will affect the feed rate. Most of these devices are equipped with a vent which will relieve any suction or back pressure that may develop within the bearing area and also provide an overflow if by chance the oil feed should become too great.

One of the simplest of the gravity feed oilers is shown in Figure 1. This unit has a transparent, plastic reservoir and features a self-closing, hinged cover to prevent contamination of the lubricant.

Another single-feed, gravity flow lubricator is shown in Figure 2. The feed rate is controlled by a precision needle valve and hairline adjustments can be made readily by a knurled cap screw located atop the reservoir. The adjustment can be locked against severe vibration. Flow of oil is started or stopped by flipping the toggle lever situated above the lock screw. The operation of this toggle is entirely independent of the feed adjustment. This feature makes this type of unit particularly adaptable to equipment which is operated intermittently. The sight glass in the mounting shaft enables one to observe the drop feeding.

By the use of a solenoid valve, the flow of oil in these gravity feed lubricators can be started or stopped automatically and tied into the machine operation. Figure 3 illustrates a solenoid operated, multiple-feed oiler. By connecting the solenoid across the line of the driving motor of the machine to be lubricated, lubrication begins as soon as the motor switch is turned on. The unit shown has eight sight feed valves, each of which is equipped with its own friction screw for independent, fingertip adjustment of the flow rate. The installation of an electric-operated, multiple-feed oiler on a punch press is shown in Figure 4.

Courtesy of Oil-Rite Corporation

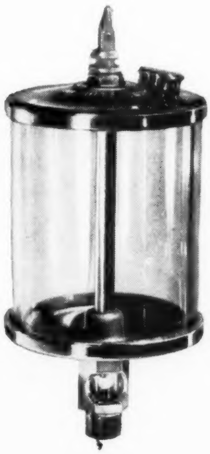


Figure 2 — Gravity Feed Oiler

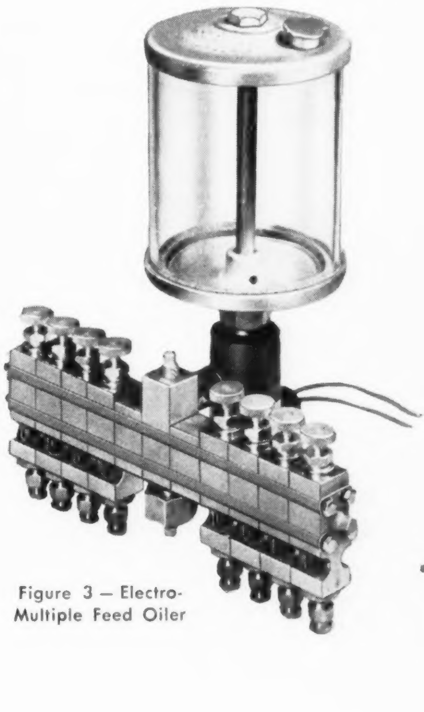


Figure 3 — Electro-Multiple Feed Oiler

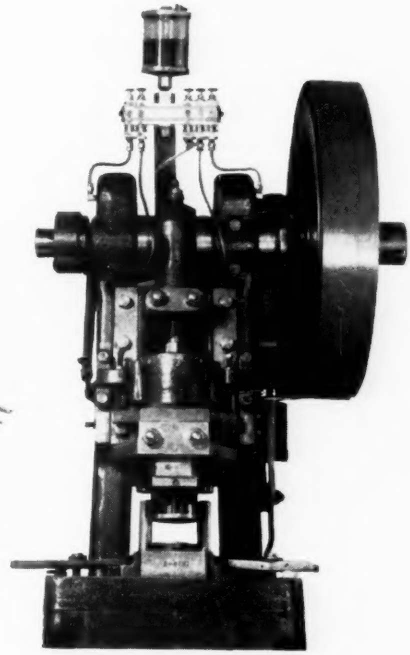
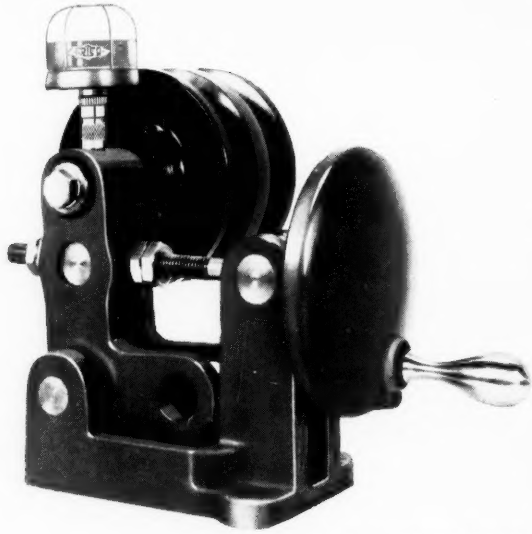


Figure 4 — Electro-Multiple Feed Oiler or Punch Press

Courtesy of Trico Fuse Mfg. Co.

Figure 5 — Thermal Oiler



Courtesy of Trico Fuse Mfg. Co.

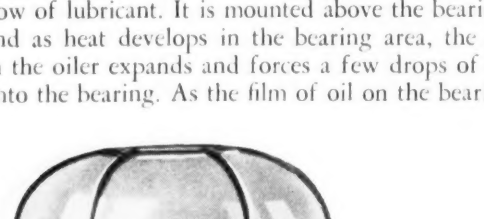
Figure 6 — Thermal Oiler on a Variable Speed Unit

Thermal Oiler

A thermal oiler is a gravity feed device which relies on temperature change to start and stop the flow of lubricant. It is mounted above the bearing, and as heat develops in the bearing area, the air in the oiler expands and forces a few drops of oil onto the bearing. As the film of oil on the bearing increases, the temperature drops and the flow of oil stops automatically. The cycle is repeated continuously as the temperature rises and falls. Oilers of this type are suited especially for lubricating bearings which require only a small amount of oil. An example of a thermal oiler is presented in Figure 5. The feed rate can be adjusted simply by turning the dome. Figure 6 shows this lubricator installed on a vari-speed unit.

Vibrating Rod Oilers

These oilers are designed for lubrication of permanently fixed shafts and other vibrating or rotating parts. They may be used where light or medium viscosity oils are satisfactory and are particularly suited for installations in dusty surroundings, for inaccessible bearings, and for intermittent operation. This type of unit consists of a transparent reservoir with a metal spindle passing from the reservoir through a tight fitting sleeve (Figure 7). When it is installed, this metal spindle or feed rod rests lightly against the part to be lubricated. As the part rotates or vibrates, the feed rod also vibrates. The pumping action permits small amounts of air to enter the reservoir, thus causing lubricant to flow through a port, down the rod to the bearing. Furthermore, should the bearing temperature increase, the heat is conducted through the feed rod to the reservoir. This causes the air in the reservoir to expand and increase the oil flow. The flow of oil ceases automatically when the rotating or vibrating member stops.



Courtesy of Trico Fuse Mfg. Co.

Figure 7 — Vibrating Rod Oiler

Constant Level Oilers

Ring, chain, and collar oiled bearings are in

effect miniature circulating systems. For example, ring oiled bearings consist of a large diameter ring, the top of which rides on top of the journal while the bottom dips into a small reservoir of oil. The rotation of the journal causes the ring to rotate and carry lubricant from the reservoir to the bearing. When lubricated manually by the squirt can, the reservoir invariably is over-filled and is not replenished until the supply has become dangerously low. Devices are available for maintaining the supply of lubricant in the system reservoir at a constant level. An example of such an oiler is shown in Figure 8. The lubricant can be adjusted easily at the desired level, and is maintained by virtue of a liquid seal between the oil in the lubricator and that in the bearing reservoir. As oil is consumed by the bearing, the level in the bearing housing drops. This breaks the liquid seal temporarily, and oil flows from the lubricator to the bearing, restoring the level in the housing to its original value. The lubricant in the transparent constant level oiler will assume the same color as that in the bearing housing, and this affords a visual check on the condition of the oil. In some instances when the bearings are operating, a considerable amount of lubricant is carried to the top of the housing. When the equipment is shut down, this oil drains back to the reservoir in the bottom of the housing. A surge reservoir in the lubricator prevents it from over-flowing.

Wick-Feed Oilers

Wick-feed oilers operate on the principle of capillary action, and deliver a slow but continuous supply of filtered oil to the points to be lubricated. They are commonly employed to lubricate bearings, guides, slides, and spindles which must operate continuously and which are located in dusty

Courtesy of Gits Bros. Mfg. Co.

Figure 8 — Constant Level Oiler

surroundings. These oilers consist essentially of a transparent reservoir containing a wick, one end of which dips into the oil while the other end leads to the bearing. The rate of oil flow varies with the oil level in the reservoir, the temperature and viscosity of the lubricant, the composition and size of the wick, and the manner in which the wick is installed. In the interest of maintaining a constant oil feed, the reservoirs should be shallow to keep the change in oil level during use as small as possible.

Wick-feed lubricators are available in a wide variety of sizes and styles, including vertical, angular, elbow, under feed and constant level. Under feed wick oilers normally are employed on small electric motors, loose pulleys, and similar applications where positive feed must be provided when

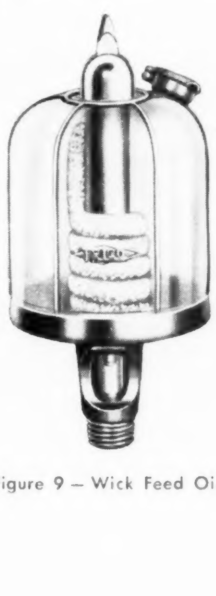


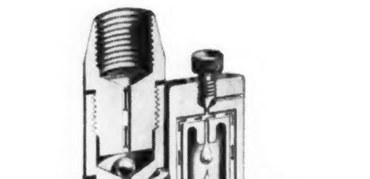
Figure 9 — Wick Feed Oiler

Courtesy of Trico Fuse Mfg. Co.

Figure 10 — Vari-Feed Oiler (right) with Removable Wicks (above)

Courtesy of Hills-McCanna Company

Fig. 11 — Ratchet Drive Force Feed Lubricator with Single Feed Outlet



Courtesy of Hills-McCanna Company

Figure 12 — Pump Valve Unit in Lubricator shown in Figure 11

the equipment is operating but where there must be protection against waste oil or leakage during idle periods.

An example of a typical wick-feed oiler is shown in Figure 9. The toggle lever at the top of the reservoir serves to start and stop the flow of oil, and the sight glass at the bottom permits the feed to be observed. If need be, the bearing can be flushed by filling the reservoir above the point where the wick enters the center tube. The surplus oil drains down into the bearing until the level is below the top of the wick, after which it feeds normally by capillary action.

A variation of the wick-feed lubricator is illustrated in Figure 10. Clean, filtered oil is fed by gravity through wicking placed in a removable retainer located at the base of the transparent reservoir. The rate of flow is controlled by the size of the wick employed. Wicks of various sizes are supplied with these lubricators and by using them singly or in combination, feed rates can be adjusted over a wide range.

CENTRAL SYSTEMS

Centralized lubrication systems which supply measured quantities of lubricant to all the bearings of a machine or group of machines are now being employed extensively on industrial equipment. Although they vary widely in design, all systems have three basic features in common, namely (1) a pump or some other positive means of delivering lubricant from a reservoir and forcing it through, (2) a distribution system of piping or tubing to (3) measuring or metering devices which regulate the amount of lubricant that is applied to each bearing. Centralized lubrication can be installed on equipment already in use, or it can be built into a machine at the time of manufacture. With the growing realization that lubrication is no longer simply a maintenance item but actually a necessary component of the equipment, more and more machinery builders are installing centralized systems as an integral part of their machines.

These systems may be characterized by the method by which they are operated, namely, manual, semi-automatic or completely automatic.

In a manual system, a pump is actuated by moving a handle or lever, and lubricant is forced through pipes to the metering valves and thence to the bearings. Obviously an operator has to pump the lubricant, and he must be relied upon to do it at the proper time.

With a semi-automatic system, the operator does not have to do the actual pumping of the lubricant. He merely pushes a button or throws a lever which actuates a power-driven pump. The pump then forces a pre-determined quantity of lubricant

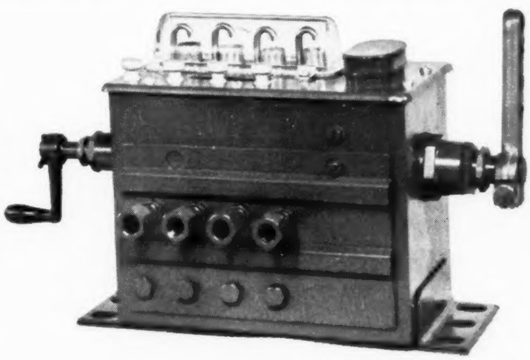
into the system where it is metered and delivered to the bearings. The operator still must be relied on to actuate the system at the proper time.

Systems that are fully automatic, in effect, rely on a timing device rather than an operator to push the button. Thus, except for filling the reservoir, the dependence on the human element to lubricate the equipment has been eliminated. The pumps may be powered directly by the machine itself or by some independent means. Likewise, the timing device may be tied in to the cycle of some moving part of the machine or it may be regulated by a clock-like mechanism.

Although there are various types of pumps and distributing facilities that are employed in centralized lubrication systems, it is in the design and construction of the measuring valves and metering devices that the manufacturers of this equipment have shown the most ingenuity. These are regarded as the heart of the system, and all designs are directed toward making them easy to install, easy to adjust, dependable in their operation and simple to maintain. Normally all systems will be equipped with devices that will indicate when a valve is not functioning properly, when the distributing lines become plugged or broken, and when the supply of lubricant in the reservoir becomes low. Some systems are equipped with safety devices which automatically stop the machine if something goes wrong with the lubrication system.

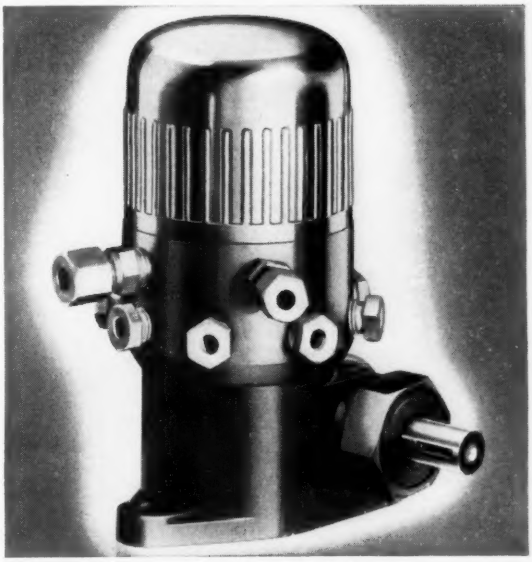
Examples of some of the various equipment for centralized lubrication will be illustrated and discussed briefly.

Figure 11 shows a single feed, fully enclosed lubricator equipped with a ratchet drive. The drive arm visible at the right is connected to a source of reciprocating motion, and this arm actuates a rocket shaft which in turn drives a crankshaft. This lubricator contains a pump valve (Figure 12) which is an independent unit bolted to the reservoir cover plate. The lubricant flow through this valve can be followed by the arrows. On the downward stroke



Courtesy of Madison-Kipp Corporation

Figure 13 — Ratchet Drive Force Feed Lubricator with Four Feed Outlets



Courtesy of Madison-Kipp Corporation

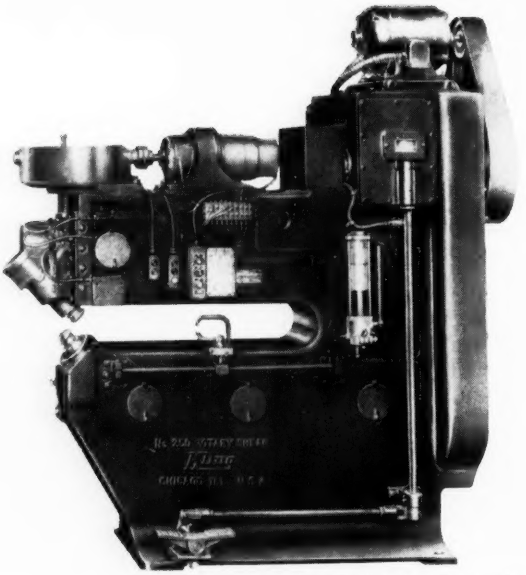
Figure 14 — Rotary Drive Lubricator

of the plunger, oil is drawn through the screen filter into the suction tube, and thence to the top of the sight glass. The lubricant drops through the center of the sight glass and continues through passages past the ball check and into the plunger chamber. On the upward stroke of the plunger, the suction ball check is seated, and oil flows past the discharge ball check into the discharge line. The amount of oil delivered per stroke can be varied from a fraction of a drop to ten drops by a knurled screw adjustment. Almost any number of individual pumping units can be included in a single reservoir.

Another ratchet-driven force-feed lubricator of this general type is shown in Figure 13. This one has four individual feed units and the pumping principle is based on registering ports. There are no valves, but positive metering is attained by means of oscillating ported plungers. Feed rates range from a fraction of a drop to ten drops per impulse, and the number of impulses per minute will depend on the speed of operation.

A rotary drive lubricator designed especially for small individual machine units is illustrated in Figure 14. It can be installed in a reservoir in the base of the machine or in one located away from the machine. Eight feed outlets are provided, and the feed per impulse can be regulated accurately from zero to two drops for each outlet.

The installation of a manually operated central lubricating system on a rotary shear machine is illustrated in Figure 15. A manual system such as this is particularly suited for equipment where lubrication is not required more than two or three



Courtesy of Trabon Engineering Corporation

Figure 15 — Manual Operated Centralized Lubrication System

Courtesy of Trabon Engineering Corporation

Figure 17 — Motor Driven Automatic Pump and Reservoir Assembly

times a shift. The group of metering valves which control the amount of lubricant going to each bearing is located at the top center of the machine. An exploded view of one of these valves or feeders is shown in Figure 16. It contains a single operating

Courtesy of Trabon Engineering Corporation

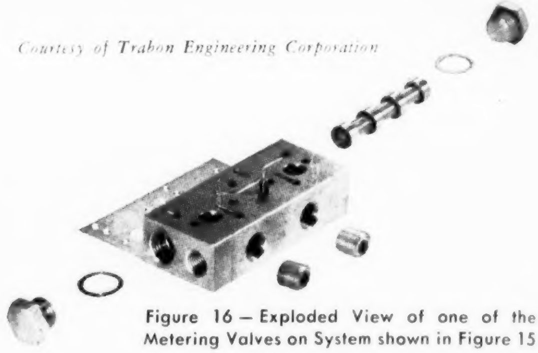
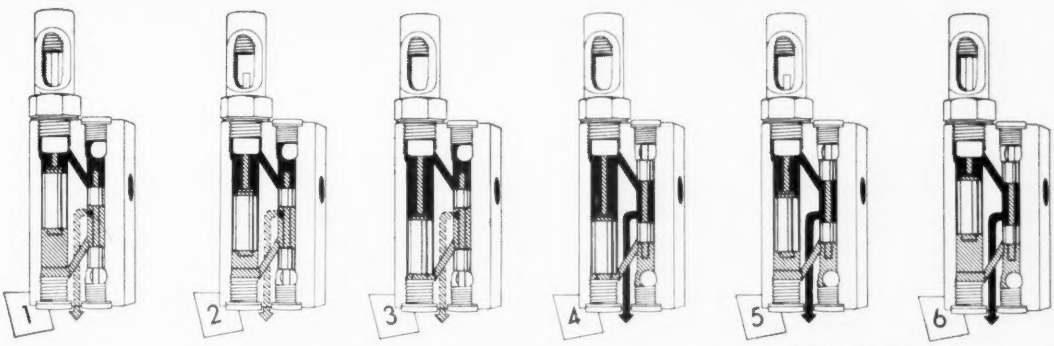


Figure 16 — Exploded View of one of the Metering Valves on System shown in Figure 15

piston, the reciprocating action of which delivers lubricant from each end of the cylinder bore. In the system illustrated, the lubricant flows in one direction only and the feeders operate progressively one after the other. The measuring pistons in each feeder section force a full, measured portion of lubricant into the individual bearing lines they serve. Each piston must complete its full stroke before the flow of lubricant proceeds to the next feeder and operates its piston. A single indicator located at the pump tells when all the points have been lubricated. For example, in a manually operated system, such as shown in Figure 15, a simple plunger type indicator is employed. After the last feeder section has been serviced, the flow of lubricant returns to the pump and causes the indicator plunger to project. This informs the operator that all bearings have been lubricated and he can stop pumping. Pin-type indicators are employed for systems that are operated automatically.

A motorized pump and reservoir assembly for continuous or time-clocked control of this central system is shown in Figure 17. The pump discharges from a single outlet and can operate at pressures up to 3,000 pounds. A safety blowout disc is attached to the base which perforates automatically when excessive pressure is built up. A pressure gauge also mounted in the pump base permits easy observation of the pressure during the pumping cycle. The unit illustrated is also equipped with blinker signal and warning devices.

The installation of another type of central system is shown in Figure 19. In this one, two main supply lines lead from the central pump and reservoir to the metering valves. A flow control valve located at the pump directs the flow of lubricant into either main line, thus providing for automatic operation of all the metering valves in the circuit. A schematic diagram showing how the measuring valve in this system operates is presented in Figure 18. It is essentially a double acting hydraulic valve which measures by piston displacement and is easily adjustable. The first three diagrams show lubricant entering the inlet at top right and crossing diagon-

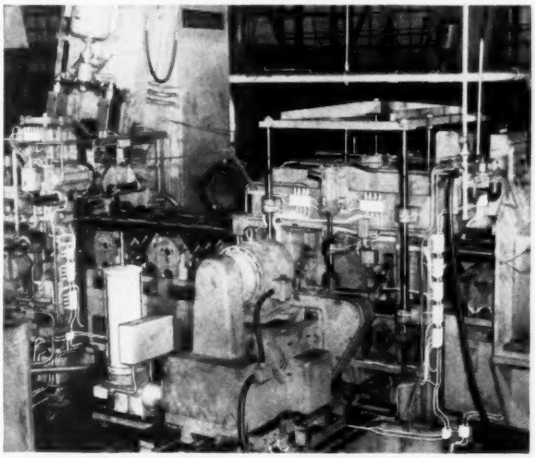


Courtesy of the Farval Corporation

Figure 18 — Operating Principle of Measuring Valve used on Central System shown in Figure 19

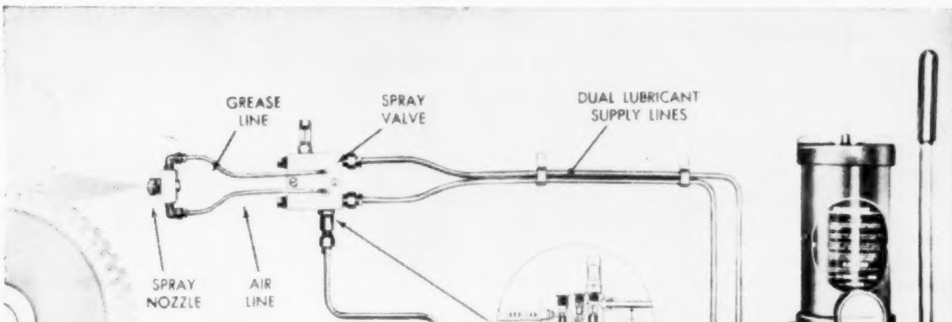
ally up and over to the chamber above the main piston. This forces the main piston down and the lubricant below it is forced through the lower diagonal passage to the outlet port leading to the bearing. This continues until the main piston has completed its downward stroke. Lubricant under pressure from the other supply line then enters the inlet at the bottom right and the procedure is reversed. The incoming lubricant forces the main piston upward and this in turn causes the oil in the chamber above the piston to be discharged to the outlet port and on to the bearings. This is illustrated in the last three diagrams. The indicator stem at the top of the valve is attached to the main piston and enables one to tell at a glance when the piston has completed its stroke.

The adaptation of this valve to a spray system designed to lubricate slide surfaces and open gearing is illustrated by the schematic sketch shown in Figure 20. The spray valve meters both the amount of air and lubricant going to the nozzles and also turns the air on and shuts it off. This limits the amount of air used to the quantity needed to spray each delivery of lubricant without exhausting or reducing pressure. Positive cut-off of lubricant by



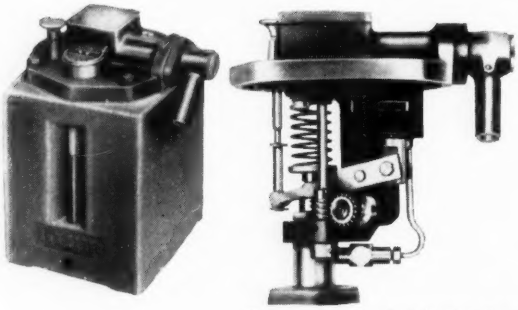
Courtesy of the Farval Corporation

Figure 19 — Installation of Centralized Lubrication System



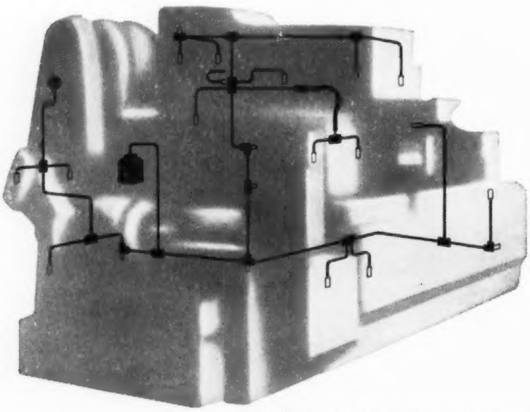
Courtesy of the Farval Corporation

Figure 20 — Schematic Sketch of Spray Lubrication System



Courtesy of Bijur Lubricating Corp.

Figure 21 — Automatic Lubricator, showing Details of Pump



Courtesy of Bijur Lubricating Corp.

Figure 22 — Diagram of Distribution System used with the Lubricator shown in Figure 21

the valve after each delivery prevents bleeding or dripping from the nozzle.

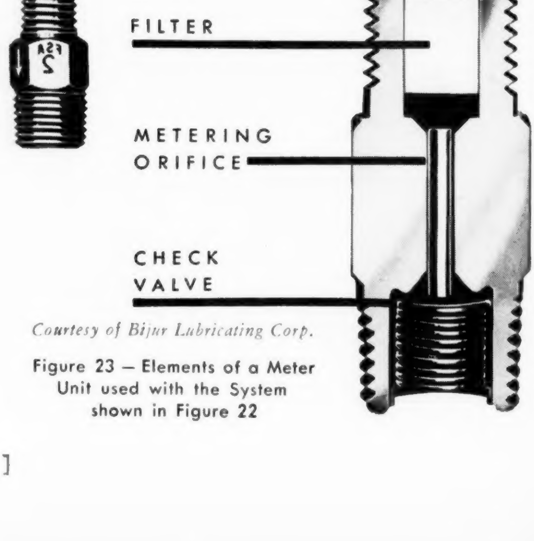
Figures 21, 22 and 23 show the three basic elements of still another centralized lubrication system, namely the lubricator, the distribution system and the meter unit. The lubricator force-feeds a definite, pre-determined volume of oil into the tubing where it is distributed to the meter-units and thence to the bearings. The feature of this system is that the amount of lubricant delivered to the system is measured and controlled at the pump, and the meter-units determine what portion of the total quantity goes to each bearing.

The cyclic lubricator illustrated in Figure 21 consists of a spring-discharge piston pump mounted in a reservoir and driven automatically by the machine or a motor. The pump is actuated through an eccentric, crank or reciprocating part of the machine. A filter located in the base of the pump permits clean oil to be fed to the system.

The distributing system shown in Figure 22 is a single line tubing circuit with branches to carry the lubricant under pressure to all points to be lubricated. If the bearings are on a moving part, a flexible hose is used to deliver the lubricant.

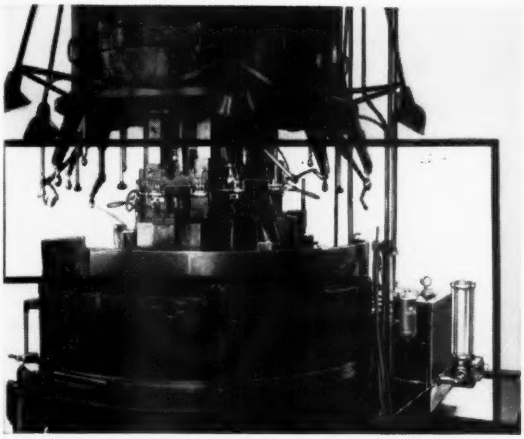
The portion of the total measured volume of lubricant charged to the system which goes to each bearing is controlled by meter units located at each point to be lubricated. Each of these small fittings (Figure 23) is a precision assembly consisting of three elements, the filter, the metering orifice, and the check valve. Although the oil fed to the system is filtered at the pump, the filter of the meter-unit gives extra assurance that any dirt which may have been in the lines does not reach the bearings. Each orifice has been calibrated and its flow characteristics established. The flow value of the orifice is indicated on the body of the unit. The check valve opens under pressure of the lubricant feed and its main function is to prevent reverse flow. When the feed stops, the check valve is closed tightly by means of a spring. This prevents leakage of the oil and maintains the distribution system full of oil between pump operations.

The installation of a centralized system designed primarily for automatic, power lubrication of individual machine units in automated production lines is shown in Figure 24. The system consists of an air-operated, single stroke pump, the operation of which is controlled by a multi-functional air valve component. This valve may be actuated manually, mechanically or electrically and the frequency of the lubrication cycle can be controlled manually, electrically by a time clock, or mechanically by cam-action off the machine. Lubricant is pumped from a transparent reservoir through a single supply line to a circuit of lubricant injectors or measuring valves that may be mounted singly or in manifolds. Seamless steel tubing or flexible feeder lines carry the lubricant to each bearing. Each injector is equipped with a visible indicator and an external manual adjustment. The installation illustrated is also equipped with saftey devices that



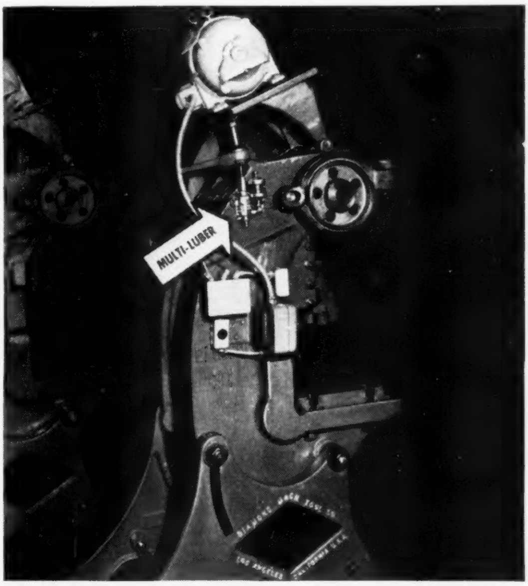
Courtesy of Bijur Lubricating Corp.

Figure 23 — Elements of a Meter Unit used with the System shown in Figure 22



Courtesy of Lincoln Engineering Company

Figure 24 — Installation of Automatic Centralized Lubrication System



Courtesy of Lincoln Engineering Company

Figure 25 — Installation of a Push Button Controlled Multiple Lubrication System

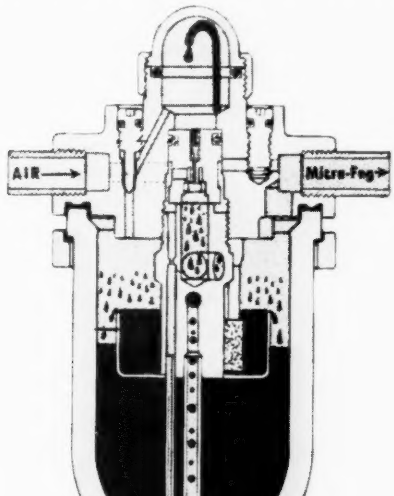
warn of low lubricant supply, damaged feed line or failure of air supply.

Figure 25 shows a simple, push-button controlled system designed to accommodate a minimum of five and a maximum of twelve bearings. It consists essentially of a transparent reservoir and a manually operated lubricator which supplies an equal amount of lubricant simultaneously to each bearing, through rigid or flexible tube lines connected to the bearing ports. The lubricator is a measuring chamber containing twelve outlet ports and fitted with a spring loaded plunger. Each port discharges a fixed amount of lubricant, and ports not used can be plugged without affecting the others. The system is operated merely by pushing down the plunger. After discharge of lubricant, the spring-loaded plunger returns to its normal position and the measuring chamber is automatically reloaded from the reservoir.

Atomized Lubrication

In recent years a new technique for applying lubricants to industrial equipment has been developed. Oil is atomized by compressed air into very minute particles and is carried in the atomized state by the air stream from the reservoir, through suitable tubing, to the individual bearings or other points to be lubricated. Systems of this type are intended to obtain the maximum lubricating efficiency from each drop of oil plus deriving additional cooling benefits from the air. They can be employed on equipment in all types of industry, but they are not to be regarded as a cure-all for every lubrication problem.

A schematic diagram of a micro-fog lubricator is shown in Figure 26. By air pressure on the oil supply in the bowl and by a siphoning action at the venturi plug, oil is carried from a constant level reservoir through the siphon tube, needle valve, and sight feed chamber, and is diffused into micro-fog in the oil bowl above the supply. The larger oil particles return to the reservoir and only particles of two microns or less are carried into the distributing lines. Actually only about five per-cent of the oil flow seen through the sight feed dome is converted into micro-fog. The rate of flow is controlled by a metering device in an auxiliary



Courtesy of C. A. Norgren Co.

Figure 26 — Diagram of Operating Principle of a Micro-Fog Lubricator

air circuit and there are no metering adjustments in the oil-feed circuit.

Figure 27 shows a picture of this lubricator connected to an air filter and regulator.

Another type of unit for atomizing oil is shown in Figure 28. In the operation of this lubricator, compressed air passes through the regulator (1) and air gauge (2). As it goes through the venturi (3), oil is drawn from the reservoir (4). The oil flow is set by the knob (5) and the mixture of air and oil from the venturi is thrust against a baffle plate. Only the smallest particles of oil are blown through the outlet into the delivery line.

Figure 29 shows this lubricator and its controls mounted together and ready to be installed on a machine. The incoming air first passes through a moisture separator (A) which removes most of the moisture. This separator also screens foreign particles from the air. The flow of air is controlled by the solenoid valve (B) and air flows to the lubricator only when the machine is on. Line air pressure is reduced by an adjustable air regulator, and the gauge registers the pressure entering the Lubricator (C). The oil reservoir has a transparent nylon window so that the oil level is visible.

SUMMARY

Satisfactory lubrication of modern industrial equipment depends on the application of the correct amount of the proper lubricant at the right time. No matter how good a lubricant may be, it cannot function and serve its purpose until it is applied to the area to be lubricated. The proper application of the lubricant is just as important to the satisfactory performance of a machine as the selection of the right product.

Many types and varieties of equipment are available for applying lubricants. Regardless of whether they be simple or complex, or whether they are designed to service one bearing or all of the machines in a plant, they all are directed toward affording a dependable and reliable means of applying lubricants and they all fill a desperate need. Some of the systems and equipment have been illustrated and discussed briefly in this article. It should be emphasized that these are merely representative examples of some of the general types, and it is not to be implied that the whole field has been covered.

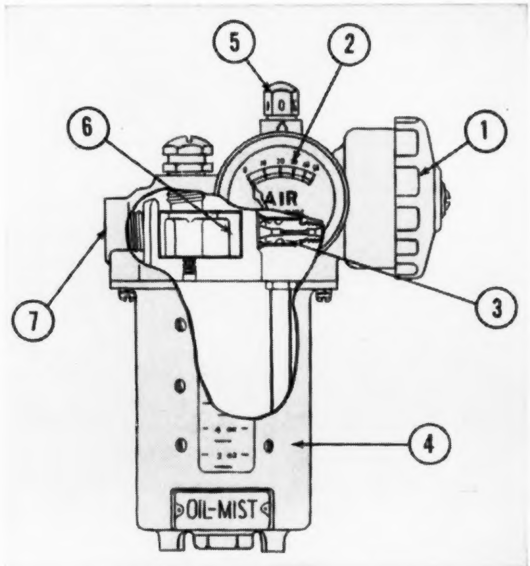


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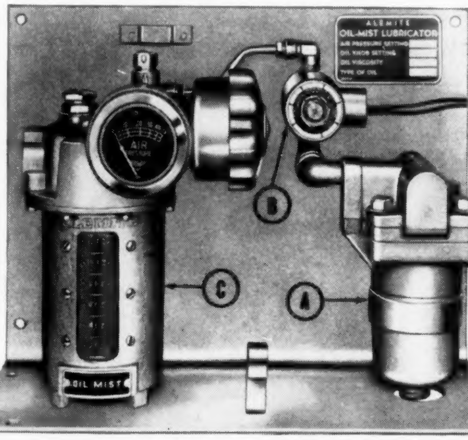
Figure 28 — Cut-Away View of an Oil-Mist Lubricator



Courtesy of Alemite Division, Stewart-Warner Corporation

Figure 29 — Oil-Mist Lubricator with Air Purifier, Solenoid Valve, and Regulator

Courtesy of C. A. Norgren Co.

Figure 27 — Micro-Fog Lubricator with Air Regulator and Purifier

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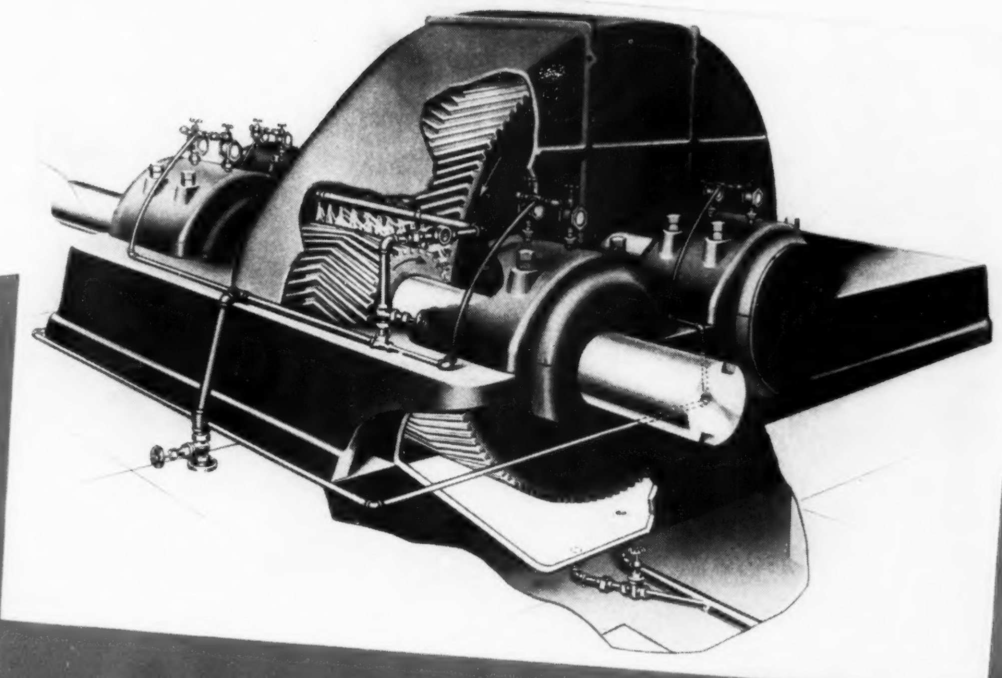

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